

STATE OF NEVADA

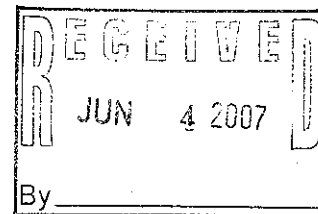
Department of Conservation & Natural Resources

DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor

Allen Biaggi, Director

Leo M. Drozdoff, P.E., Administrator



May 31, 2007

Mr. Mark Paris
Basic Remediation Company (BRC)
875 West Warm Springs
Henderson, NV 89015

Mr. Craig Wilkinson
TIMET
PO Box 2128
Henderson, NV 89009

Re.: Nevada Division of Environmental Protection Letter Regarding:
Background Surface Soil Summary Report
Dated March 16, 2007
NDEP Facility ID# H-000688 and H-000537

Dear Mr. Paris and Mr. Wilkinson:

The Nevada Division of Environmental Protection (NDEP) has completed a review of the aforementioned document. The NDEP's comments are provided as Attachment A to this letter.

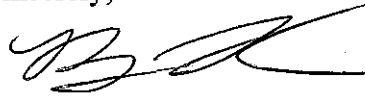
Please note that it appears that a resubmittal of this report may not improve the usability of the report. NDEP's comments are generally provided for completeness of the administrative record and as a consideration for future users of this data set. BRC, TIMET and others must consider these comments in future applications of the background data. In some cases the NDEP is requesting that errata pages be provide to address certain errors in the report. Please note that the data set is generally usable and should be with consideration of the NDEP's comments.

Please provide the errata pages by **June 29, 2007**. If this is not feasible, please contact the NDEP.

Should you have any questions or concerns, please do not hesitate to contact me at (702) 486-2850x247.



Sincerely,



Brian A. Rakvica, P.E.
Supervisor, Special Projects Branch
Bureau of Corrective Actions

BAR:s

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Attachment A

1. General comment, please note that a response to this comment is not desired or necessary. A number of results were censored due to analytes in the blanks. The analytes that were censored are in the table below. It is possible that this censoring will result in a generally higher concentration/activity set for these analytes.

Analyte	Blank Value	Censored Ranges (high value)
Radium-228	0.49 (SDG 308,p 9) 0.71 (SDG 233, p 8)	1.7 pCi/g
Uranium 233/234		1.3 pCi/g
Thorium 231		0.2 pCi/g
Radium-226	0.15 (SDG 233, p 8)	1 pCi/g
Niobium		2.5 mg/kg
Thallium		0.6 mg/kg
Boron		8.3 mg/kg
Tungsten		2.2 mg/kg
Sulfate, Chloride, fluoride		

This comment is included for the completeness of the administrative record and as a consideration for future users of this data set.

2. General comment, it appears that a response to comments (RTC) letter was not generated for this report. Please note that an RTC letter must be generated for all instances that NDEP comments are issued, unless indicated otherwise by the NDEP. No response is required for this comment.
3. General comment, the text does not make it sufficiently clear why NDEP wanted to include the Environ data in the background data set. Without the rationale for doing so, it becomes unclear why the analyses were performed the way they were. The point was that the Environ data provided greater geographic and geologic coverage that was relevant to the Henderson site. The BRC/TIMET background data do not substantively cover the River Range, but that was the primary focus of the Environ data. The greater geologic coverage might provide greater range in background concentrations for some metals, and that might be relevant for future uses of the data. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
4. General comment, we note that the Environ results for some metals involved use of different analytical methods with lower detection limits than were available for the BRC/TIMET analyses. We acknowledge that this makes combining these data difficult. However, the more important issue now, is what analytical methods will be used for data collected from the site. For background comparisons, data comparability is very important, and it seems that remediation

decisions at this site might often be based on background concentrations. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**

5. General comment, regarding the results and the use of the data. Various differences are identified in this report (e.g., depth and origin). However, our intent was not to identify differences so directly for the purpose of subsetting the data. It may be very reasonable to combine the data across depths and origins depending on the intended use of the data. For example, if another project in southern Nevada or the Mojave desert needed background data as a reference source, these full combined data could be used. The depth or origin differences could be irrelevant. The same might be true if the data set was used for background comparisons applied to the entire BRC site. However, it might prove prudent to sometimes use subsets of the data if a more localized application is required. This is the reason for evaluating the data for different subpopulations. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
6. General comment, multiple comparisons are used to support decision making for each analyte. However, it appears that a significance level of 0.05 is used in each case. Multiple comparisons usually lead to use of a family-wise correction to the significance level used. Simple adjustments include dividing the significance level by the number of multiple comparisons that are run. This is an option that could be considered for the comparisons presented in this report. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
7. General comment, as noted previously, selenium has a large space between the detection limit and the lowest detected value. Lab reports should be reviewed to ensure that there are no analytical errors in the laboratory analyses. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
8. General comment, The radionuclide results are curious given that these are background soils. That is, within the same chain, the radionuclides should be in secular equilibrium, in which case the basic conclusions should be the same for each radionuclide in the chain. This is often not the case. Perhaps use of a family-wise error rate would help, but this requires further investigation to sort out why some show differences and some do not. For example, BRC/TIMET concludes that a parent radionuclide may be consistent with background, however, the daughter products may not be. This does not make sense if the radionuclides are in secular equilibrium. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
9. General comment, formal statistical comparisons are presented for depth ranges and for origin of the data. Similar comparisons are not made for the BRC/TIMET data compared with the Environ data. This could add to the analysis. Also, very little is made of the location differences that are seen in the dot plots. These could be used to help illustrate any differences that are demonstrated with the statistical tests. **This comment is included for**

completeness of the administrative record and as a consideration for future users of this data set.

10. Section 1.1, the objectives could be stated a little differently, perhaps in terms of potential uses of the data, as well as in terms of which comparisons are performed. The combined data set is a rich data set in terms of number of samples, and geographic, geologic, and depth coverage. There are potentially many uses of these data that can be imagined, which might reasonably be applied to any southern Nevada or Mojave desert project. The reason for evaluating the data for subset differences is more for more local uses. For example, the upcoming Parcel 4A/4B analysis is so localized that it might be important from the perspective of background comparisons to be able to use an appropriate subset of the background data, instead of all the data. It would help explain the context of the analysis if this was made clearer. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
11. Section 2.1, page 2-1, it would be helpful if it was made clear at the beginning of this section that the section covers the BRC/TIMET background study only, and that the ENVIRON data collection is not discussed. This comment applies to sections 2.2 and 2.3 as well. NDEP notes that the future reviewer should reference the ENVIRON report for collection of data for that study. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
12. Section 2.2, page 2-3, 1st paragraph, 3rd sentence states "Samples collected from each boring at each of the 11 locations are considered independent samples (not field duplicates)." The discussion on page 3-1 addresses the NDEP's original comment to some extent, however, there is still no qualitative or quantitative assessment of the spatial independence assumption. Even a cursory review of the individual value plots in Appendix G would provide some indication of the applicability of the independence assumption. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
13. Section 2.3, 8th line, the term PQL is used here, but it seems that a sample quantitation limit was used to report the data. Some clarification is needed; sometimes the report refers to PQLs and sometimes to sample quantitation limits. **Please provide an errata.**
14. Section 2.4.2, page 2-7, last paragraph, regarding Radium 226 and 228. Neptune provided the following comment previously: "The quality control information, including barium yields, generally met the method requirements. However, recent data from STL St. Louis for these analytes indicated a bias due to the barium yields. It is likely that the barium yields in this data set do not include the radioisotope barium and may be subject to the same bias. The data is not rejected purely due to analytical considerations however the data should be used with caution." In this document the Ra-226 and Ra-228 data have been rejected, but without any form of explanation other than lack of QC information. This is inadequate. If BRC/TIMET chooses to reject these data some additional

rationale/explanation should be given. **Please provide an errata regarding this issue.**

15. Section 2.4.2, page 2-7, 2nd sentence, the sentence is not correct. It should be noted that the information referenced in this sentence was not available in the data packages from the Environ project. This had nothing to do with Neptune, as is currently stated. Neptune reviewed all the material that was available. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
16. Section 3.1.1, page 3-1, it isn't clear that this section addresses the comment made in the previous draft. The intent of the suggestion to discuss spatial independence assumptions is to delineate the potential impact on the results of distribution comparison tests. That is, in the presence of spatial correlation, the effective sample size is reduced due to the redundancy of information among samples. The effect is seen clearly in the dot plots for most chemicals. The within location variability is much smaller than the between location variability. Hence, there is a spatial correlation component, and that component is ignored by the statistical tests that assume independence. That is the point. The test results probably overstate statistical differences because the actual sample size used in the tests is greater than the effective sample size because of the (fairly strong) spatial correlation. So, statistical differences probably show up in the tests more often than is reasonable. This is an important point when it comes to discussing potential future use of these data (although that subject is also inadequately addressed in this report). Further, the last sentence of this section states "therefore, when statistical tests are performed, it is expected that some spatial correlation may be seen". This misses the point. It is not that spatial correlation will be seen in the tests, it is that spatial correlation is ignored by the tests. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
17. Section 3.1.2, page 3-3, Fourteenth item in the numbered list. 11th bullet, regarding the PQL – is this what was used, or was a sample quantitation limit used instead? **If the text is correct nothing further is required if this is an error please provide an errata.**
18. Section 3.1.2, page 3-3, the word "registered" should be changed to "rejected".
19. Section 3.1.2, page 3-4, 3rd bullet, regarding radionuclides and detection limits. It is not clear why the radionuclide data were censored for any potential use. In the list in this bullet there are four radionuclides referenced. This implies the MDA was used to judge detection frequency. It is not clear that this is helpful when the actual result is reported for every sample. This seems to defeat the purpose of statistical analysis, and instead focuses on the one sample result at a time approach that is so difficult to overcome with statistical analysis. From a risk perspective (or a background comparison perspective to some extent), we are ultimately much more interested in the mean concentration, than we are in a single concentration, and censoring does not help the statistical analysis. So, it is not clear why, given the reported radionuclide concentrations, any effort has been made here to censor the radionuclide data. In addition, given the list as presented, it would seem that U233/4 should be added. For example, in Table 2

on page 3-6, it is not clear why the detection frequency differences for U233/4 are not also addressed. For clarity the NDEP may choose to re-run some of these analyses. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**

20. Section 3.1.3, page 3-7, a quotation is given from some DOE guidance. This quotation essentially indicates that substitution should not be used for radionuclide data that are uncensored. It is difficult to understand, therefore, why the summary statistics presented for radionuclides involve censoring of the data at the MDA. It appears as though the plots used the actual values. On Page 3-8 there is a sentence that states that it is always critical to note and consider the detection frequency. It seems more important to be able to compare distributions with the actual data than to compare the number of data points that are below censoring limits. Censoring removes information and is not helpful. Comparisons made in the future must consider this issue. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
21. Section 3.1.3, page 3-8, second paragraph, third sentence states, "It is always critical to note and consider detection frequencies when assessing the data for each analyte." Please note that censoring removes information, hence, it is difficult to understand why this is viewed as a good thing. In terms of the summary statistics compared with the plots and statistical test results, it is now difficult to match them up. Tests of the means cannot be easily compared with summary statistics that involve censoring. NDEP may choose to regenerate some of these tables for clarity. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
22. Section 3.1.4, page 3-8, it is not clear how detection status was assigned for split samples where one of the splits was detected and the other was not. **Please provide an errata page to address this issue.**
23. Section 3.1.4, page 3-8, please clarify how field duplicates were treated in this analysis. **Please provide an errata page to address this issue.**
24. Section 3.1.5, page 3-10, uranium outlier discussion, whereas the plots support the argument made for changing this one value, was the same transformation used on the remaining U data to verify that it yields reasonable results in those cases as well? **Please provide an errata page to address this issue.**
25. Section 3.1.6, page 3-10, first paragraph, third sentence states, "A p-value greater than or equal to 0.05 indicates that the null hypothesis of normality is rejected at the 95 percent confidence level." Please note that The word "greater" should be changed to "less". We note that although the text was incorrect, the results of the hypothesis tests were interpreted correctly with respect to rejection of the null hypothesis. **Please provide an errata page to address this issue.**
26. Section 3.2.1, page 3-11, first sentence, please note that the goodness-of-fit tests referred to appear to be the Shapiro-Wilk (S-W) tests, which test normality. That is, reference should be made instead to the S-W test and to testing normality instead of the "underlying distribution". **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**

27. Section 3.2.1, page 3-12, last sentence, please note that inflection points should be used very cautiously. Inflection points are not tested statistically, and are often used, unfortunately, to identify only a handful of high concentrations. When so few samples are identified the issue is probably randomness rather than different populations. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
28. Section 3.4.1, page 3-20, second paragraph, sixth sentence states, "If Shapiro-Wilk W test results indicate that the normality assumption is reasonable (for example, a $p\text{-value} \leq 0.05$), then the ANOVA and Tukey HSD tests provide a reasonable assessment of differences among concentrations and activities; however, if the Shapiro-Wilk W test results indicate that the normality assumption may be unreasonable (for example, a $p\text{-value} < 0.05$), then the Kruskal-Wallis and Behrens-Fisher results probably provide a better assessment of differences among concentrations and activities." The phrase "for example, a $p\text{-value} \leq 0.05$ " should be replaced with "for example, a $p\text{-value} > 0.05$ ". **Please provide an errata to address this issue.**
29. Section 3.4.3, page 3-22, second paragraph, fourth sentence states "Results that are statistically significant at a p-level of 0.5 are shaded in the table." This sentence should be replaced with "Results that are statistically significant at the 0.05 significance level are shaded in the table."
30. Section 3.4.3, page 3-22, second paragraph, last sentence states "Statistical tests provide a quantitative analysis to determine if the differences are statistically significant at a specified confidence and power." This sentence should be replaced with "Statistical tests provide a quantitative metric to determine if the differences are statistically significant at a specified significance level (e.g. 0.05)." Note that power is not evaluated and this issue resonates through the document. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
31. Table 3, page 3-23, the NDEP has the following comments:
- a. for a number of the analytes where significant differences were found among depths, the conclusion listed is that "Differences are attributed to naturally occurring sample variability." At a significance level of 0.025, we would expect that roughly two or three analytes out of 100 would show significant differences, when in fact no difference exists. These errors could be attributed to the intrinsic variability in the population. However, this conclusion is used too often to be plausible. Ultimately the point is that there are differences. This does not mean that the dataset cannot be used as a whole. It will depend on the application, and this is probably what should be understood. Note also that for the multiple comparisons, it would be very reasonable to use a family-wise error rate. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
 - b. For radionuclides, the conclusion "Insufficient number of detected activities" does not make sense. Since activities are reported and not censored by detection limits, there would seem to be sufficient data to perform these tests. **This comment is included for completeness of the**

administrative record and as a consideration for future users of this data set.

32.

33. Section 4.0, page 4-1, last paragraph, please note that no statistical calculations were performed to justify this sample size, instead it was reached based on agreement. Consequently, use of words such as required and determined exaggerate what was actually agreed to. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**

34. Section 4.0, page 4-2, first line, please note that without access to a specific site data set, it is not possible to say with such certainty that there will be sufficient confidence and power. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**

35. Section 4.0, page 4-2, last paragraph, please note that there is rationale for subsetting the background data, and the statistical analysis demonstrates that (i.e., supports the idea of geologic differences, etc.), but there is no need to subset the data depending on the application. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**

36. Section 5.0, as noted previously, the NDEP notes that the intent should probably be more along the lines of how to use these data in future background comparisons. Please see comments above regarding use of the data. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**

37. Appendix E, the NDEP has the following comments:

- a. Table E-7, note that two negative correlations are not shaded in both places. Note also that 4 of the negative correlations are significant, and 5 are not. This is hardly compelling enough to state that "most are not statistically significant" (see footnotes to table). **Please provide an errata to address this issue.**
- b. Table E-8, regarding the denotation X in this table and the corresponding footnote. It is not clear why the isotope Ra-224X was calculated from Pb-212, as opposed to a different isotope. **Please clarify this in the footnote and provide an errata page.**
- c. Correlations of Aluminum and Trace Metals, the histograms do not appear to be particularly useful or relevant. Similar comments can be made on subsequent plots. Note that correlation coefficients are not provided on these plots but should be. **This comment is included for completeness of the administrative record and as a consideration for future users of this data set.**
- d. Correlations with Barium, these correlations and regression lines appear to be driven by a few influential points. It is not clear at all that there is any effect worth reporting here. Similar comments can be made for correlations with silicon. Note also that all correlation coefficients given for silicon are in bold and it is not clear why. It is also not clear why the

larger silicon correlation plots are separated out. **Please clarify this in notes and provide errata pages.**

38. Appendix F, the NDEP has the following comments;

- a. Title Page, please note that the 3rd item appears to be in error, and should refer instead to the Environ data. **Please provide an errata page to address this.**
- b. Figure F-1 and all similar Figures, it would be more helpful if the side by side plots comparing different subsets of the data were placed in the same scale. It is difficult to see differences that exist when different scales are used. **This comment is included for use in future reports.**